

Appln. No. 09/805,833
Amendment After Final Rejection filed January 22, 2004
Response to Office Action dated August 14, 2003

REMARKS

Claims 1-14 are pending in this application and stand rejected. Claims 1 and 8 are independent.

By this Amendment Applicants seek to revise claims 1 and 8. Upon entry of this Amendment claims 1 and 8 will remain independent.

The revisions to claim 1 are fully-supported by the application as filed, for example, at page 26, line 21, et seq. So too, the revisions to claim 8 are fully-supported by the application as filed, for example, at page 14, lines 5-17.

The Rejections Under 35 U.S.C. § 103

Claims 1 and 8¹ have been rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 5,317,348 to Knize in view of U.S. Patent No. 5,796,771 to DenBaars et al. Applicant respectfully traverses this rejection and submits the following arguments in support thereof.

Applicant's invention, as described in claim 1, concerns a color laser display having a red laser light source for emitting red laser light, a green laser light source for emitting green laser light, a blue laser light source for emitting blue laser light, and modulation means for modulating the red, green and blue laser light, based on a red image signal, a green image signal, and a blue image signal. A screen displays red, green and blue

¹ It is noted that while the first paragraph of this rejection speaks of claims 1 and 14, the body of this rejection refers to claims 1 and 8. It is understood that this rejection in fact applies only to claims 1 and 8. If, however, this understanding is incorrect, it is respectfully requested that the Examiner contact Applicant's undersigned attorney by phone to discuss this point.

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when irradiated with the red laser light, green laser light, and blue laser light, and a projection means projects the red, green and blue laser light onto the screen so that an image, carrying the red, green, and blue image signals, is displayed on the screen. An excitation solid laser unit, having a solid-state laser crystal comprising a $\text{Pr}^{3+}:\text{LiFY4}$ crystal doped with Pr^{3+} and a GaN semiconductor laser element emitting excitation light at a wavelength of 440 nm for exciting the solid-state laser crystal, is employed as at least one of the red, green or blue laser light sources.

Similarly, claim 8 is drawn to a color laser display with a red laser light source for emitting red laser light, a green laser light source for emitting green laser light, a blue laser light source for emitting blue laser light, modulation means for modulating the red, green and blue laser light, based on red, green and blue image signals, and a screen for displaying red, green, and blue when irradiated with the red, green and blue laser light. A projection means projects the red, green and blue laser light onto the screen so that an image, carrying the red, green, and blue image signals, is displayed on the screen. A fiber laser unit having a fiber, that is one of a Zr fluoride glass-doped fiber and an In/Ga fluoride glass fiber, with a Pr^{3+} -doped core and a GaN semiconductor laser element emitting excitation light at a wavelength of 440 nm for exciting the fiber, is employed as at least one of the red, green or blue laser light sources.

According to the present invention, the combination of GaN and the $\text{Pr}^{3+}:\text{LiFY4}$ crystal of the solid-state laser of claim 1 makes it possible to realize the excitation using the transition of $^3\text{H}_4 \rightarrow ^3\text{P}_2$.

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Similarly, those skilled in the art will recognize that one aspect of the present invention is to realize excitation with a GaN-LD such as that of claim 8, which is capable of exciting a transition of $^3H_4 \rightarrow ^3P_2$.

Since the present invention involves the use of a transition of $^3H_4 \rightarrow ^3P_2$, laser oscillation light can be obtained by the transition from $1I_6$, $3P_1$ or $3P_0$, which are at a lower level than $3P_2$, to a lower level ($3F_2$, $3H_6$, $3H_5$, $3H_4$). Therefore, in the present invention, a laser oscillation having a third level ($^3P_0 \rightarrow ^3H_4$: 490 nm) or fourth level (other oscillation light, such as green light or red light) can be achieved. An oscillation having higher efficiency can be achieved in the present invention compared with the '007 patent or the '771 patent. Therefore, high output power, which is very important for a laser display, can be realized with the structure of the present invention.

As the present invention realizes an oscillation having a single wavelength, high efficiency and reduction of the number of parts for manufacturing the apparatus can be achieved.

According to the present invention, a transition at a specific excitation level can be prescribed by the combination of Pr^{3+} and the laser medium, whereby an oscillation wavelength of the GaN-LD, which is capable of highly efficient oscillation, can be specified.

Knize does not teach or suggest using light having a wavelength of 400nm as an excitation source, or using a specific laser medium, much less doing so as claimed, in part, with a solid-state laser crystal including a $Pr^{3+} : LiFY_4$ crystal.

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While DenBaars may teach the emission of pump light having a wavelength of 400 to 500nm (Example 1), DenBaars does not teach or suggest the use of a transition of $^3H_4 \rightarrow ^3P_2$ in cases of Pr^{3+} .

Because neither of the cited references suggests all these aspects of the invention, such as excitation using the transition of $^3H_4 \rightarrow ^3P_2$, the claimed invention patentably distinguishes over such art. Accordingly, for all the foregoing reasons, favorable reconsideration and withdrawal of this rejection is respectfully requested.

Claims 2-7 and 9-14 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Knize in view of DenBaars as applied to claims 1 and 8, and further in view of U.S. Patent No. 5,727,007 to Smart.

Claims 2-7 depend from claim 1, and claims 9-14 depend from claim 8, already shown to patentably distinguish over Knize and DenBaars. These dependent claims therefore incorporate by reference all the features of claims 1 and 8, including those features already shown to avoid Knize and DenBaars, and so avoid that art at least for the same reasons as their respective base claims.

Smart in no way remedies the deficiencies of Knize and DenBaars.

Smart does not even suggest the use of a transition of $^3H_4 \rightarrow ^3P_2$. Further, in Smart, since the light at a wavelength of 490 nm is related to a transition of $^3P_0 \rightarrow ^3H_4$, there is no difference in energy between 1I6 and 3P0, and between 3P1 and 3P0, and the transition will be close to a second level (pseudo second level). Therefore, in Smart, the output power of the laser is low.

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Since Smart suffers from the same deficiencies as the other references, the claimed invention patentably distinguishes over the applied art for the reasons already given in connection with the rejection of claims 1 and 8, which reasons are incorporated by reference herein.

For all the foregoing reasons, favorable reconsideration and withdrawal of this rejection are respectfully requested.

CONCLUSION

Applicant respectfully submits that all outstanding rejections have been addressed and are now either overcome or moot. Applicant further submit that all claims pending in this application are patentable over the prior art. Reconsideration and withdrawal of those rejections and objections is respectfully requested.

In view of the foregoing revisions and remarks, Applicants respectfully request entry of this Amendment and submit that entry of this Amendment will place the present application in condition for allowance. It is further submitted that entry of this Amendment can be approved by the Examiner consistent with Patent and Trademark Office practice, since the changes it makes should not require a substantial amount of additional work by the Examiner. It is believed that the changes presented in this Amendment either address matters of form or issues that the Examiner has previously considered.

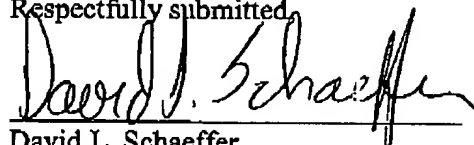
Favorable consideration and prompt allowance of this application is respectfully requested. In the event that there are any questions, or should additional

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information be required, please do not hesitate to contact applicant's attorney at the number listed below.

Respectfully submitted,



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